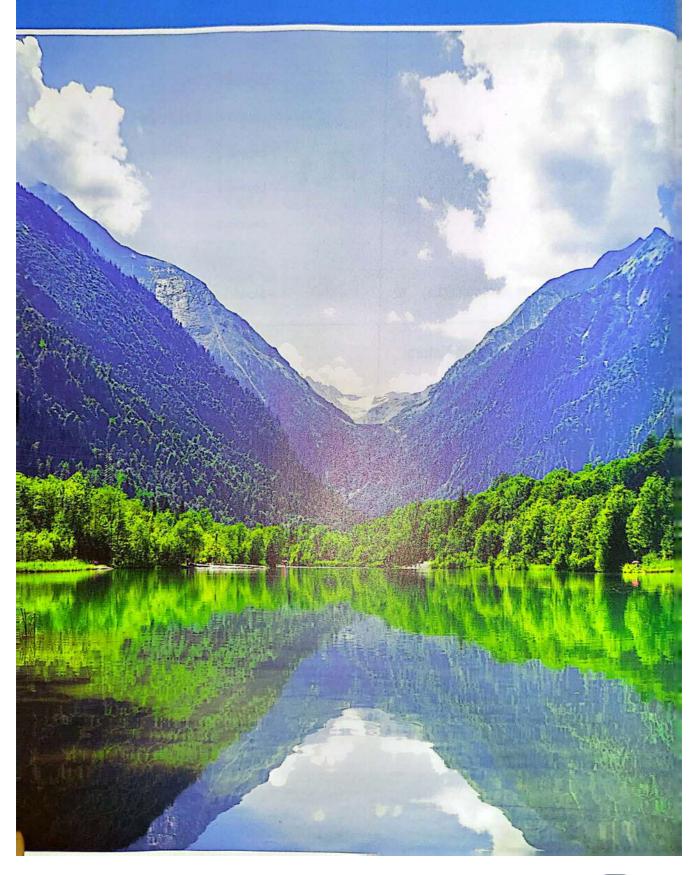




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Theme Three: Protecting Our Plans Sour Earth's Resources



Get Started

What | Already Know

- Water is an important natural resource for all living organisms to survive, where:
 - Animals and plants need water to survive.
 - People use water for drinking, cooking, bathing and even playing.
- The freshwater resources on the Earth decreases gradually due to climate change, pollution and water waste.
- Recycling of wastewater is one of the solutions to conserve freshwater resources, where:
 - Water that we use for washing and showering can be filtered and cleaned, then used again for other purposes such as irrigation of farms.
 - The Bahr Al-Baqar wastewater treatment plant in Egypt is one of the largest water treatment plants in the world.



Bahr Al-Baqar wastewater treatment plant

- · In this unit, you are goint to study:
 - Importance of water.
 - The interactions between different spheres (or subsystems) of the Earth.
 - Water as a valuable natural resources.
 - How to protect the Earth's natural resources.
- · Unit project : "We all live Downstream"

At the end of this unit, you are going to make a model of water sources to show how pollution in one of the water sources can affect other water sources, and also how living organisms can be affected by water pollution.



Concept 3.1

Hydrosphere and Biosphere Interactions







Learning outcomes

By the end of this concept, your child will be able to:

- Classify systems on Earth as parts of the hydrosphere, biosphere, geosphere and atmosphere.
- Develop a model of interactions between the hydrosphere and the biosphere.
- Identify defining characteristics of different aquatic ecosystems.

Key vocabulary

- Estuary
- Geosphere
- Aquifer
- Atmosphere
- Glacier
- Biome
- Groundwater
- Biosphere
- Hydrosphere
- Ecosystem



Activity 1 Can You Explain?







- The Earth is a complex system that includes living organisms and nonliving things that interact with each other.
- Scientists have divided the Earth into four main systems (or spheres) which are:
 - · Geosphere:

It is the system that includes:

- Rocks on the Earth's crust.
- Molten rocks and heavy metals that lie under the Earth's crust.

· Atmosphere :

 It is the system that is composed of a mixture of some gases such as nitrogen, oxygen, carbon dioxide, water vapor ... etc.

· Biosphere:

It is the system that includes all living organisms such as microorganisms, plants, animals, humans ... etc.

Hydrosphere:

It is the system that includes all water on the Earth (fresh water and salt water).

▶ How does Earth's biosphere interact with Earth's hydrosphere?

All living organisms in the biosphere interact with the hydrosphere, where :

- Humans and animals drink water.
- Some animals and plants live in water.

In this concept, we will study:

- The importance of water for life on Earth.
- Hydrosphere and biosphere interactions.
- Characteristics of the hydrosphere and biosphere.
- Types of aquatic ecosystems.

مرکب / معقد geosphere الغلاف الحيوى الغلاف الأرضى complex biosphere الغلاف الهوائي صفات characteristics interact يتفاعل atmosphere القشرة الأرضية النظام البيئي المائي aquatic ecosystem الغلاف المائي hydrosphere Earth's crust

Activity 2 Water's Impact on Living Organisms

▶ Put (√) or (x):

- Water causes some weather phenomena such as raining and snowing. ()
- All living organisms except plants need water to survive.



- · Water is important for all living organisms and also can affect nonliving things.
- How do living organisms use water?
 Living organisms need water to drink, grow and survive.
- How does water affect nonliving things?
 Water can cause weathering and erosion of rocks on the Earth's surface.



Weathering of rocks by water

Notes

- 1. Weathering means the breakdown of rocks into smaller particles due to the effect of rain, wind, temperature ... etc.
- 2. After rocks are broken down, erosion process happens which means the transportation of small particles of rocks to another place by water or wind.



Check your understanding

▶ Complete the following sentences using the words below :

(erosion - water - weathering)

- 1. Living organisms need to survive.
- 2. Water can cause _____ then ____ of rocks.
- ▶ Put (√) or (x):
 - 1. Earth's systems are divided into geosphere and biosphere only. ()
 - 2. Fresh water and salt water belong to the hydrosphere. ()

impact نائير weathering النحوية transportation

Activity 3 The Importance of Water for Life on Earth

- Water is found everywhere on Earth, where it is found in rivers, lakes, oceans, seas and underground.
- Nearly three-quarters of Earth is covered by water, so our planet looks like a blue marble from space.



Water bodies on Earth can change from liquid state to:

Solid state (ice) by freezing in extreme cold weather

Gas state (water vapor) by evaporation in hot weather

 The total amount of water on Earth does not change, even if water changes from one state to another, so we cannot make new water, but we can recycle it.

Importance of water for life

Water is important for life of living organisms on Earth, where:

Humans and animals drink water to survive.



Plants need water to grow.



Some animals and plants live in water.



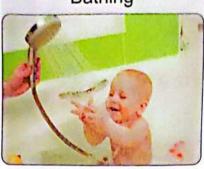
Uses of water

Humans use water in many purposes such as:

Preparing food



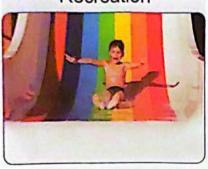
Bathing



Cleaning



Recreation



Travelling



Manufacturing





Check your understanding

- ▶ Put (√) or (x):
 - 1. The total amount of water on Earth does not change.
 - 2. Half of Earth's surface is covered by water.
- 3. When water freezes, it changes to water vapor.

- ()
- ()
- (

Activity 4 What Do You Already Know About Hydrosphere and Biosphere Interactions?

Water bodies on Earth have different forms and locations such as :

Oceans and seas:

- They are very large water bodies.
- Oceans and seas always contain salt water.



Lakes:

- A lake is a water body that is surrounded by land.
- Lakes are often contain fresh water, but sometimes they contain salt water.



Rivers:

- A river is a water body that always flows from an area of high altitude (high place) to an area with lower altitude (lower place) in a definite channel.
- Rivers always contain fresh water.



Estuary:

- It is a water body at which the fresh water of a river meets the salt water of a sea or ocean.
- Estuaries always contain mixture of salt water and fresh water.



Runoff:

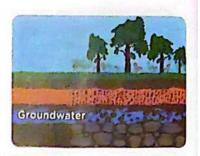
It is a water body that is formed of water from rain or melting of snow and moves into rivers or the ground.



			Total Control		
interactions	تفاعلات	sea	بحر	river	نهر
estuary	مصب النهر	ocean	محيط	lake	بحيرة
altitude	ارتفاع	runoff	جریان سطحی		

Groundwater:

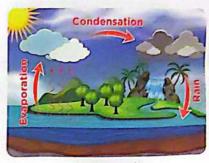
It is the water that lies beneath (under) the Earth's surface.



Is water a renewable resource?

- Water that forms the hydrosphere is one of the renewable resources on Earth because it has what is called "water cycle" in nature.
- · During the water cycle in nature :
- Water presents in water bodies on Earth evaporates and goes into the air forming clouds.
- Water returns back to the Earth's surface during raining.

Renewable resource means a natural resource that can be replaced.



Water cycle

Are plants considered a renewable resource?

- Plants are one of the components of the biosphere on Earth.
- Plants can be planted from seeds that grow up forming new plants.
- Plants depend on water to grow and survive, so plants are affected if the amount of water decreases or water get polluted.



From the previous explanation, we can observe that :

Hydrosphere interacts with biosphere, where living organisms (such as plants) in the biosphere depend on the hydrosphere to survive.



Check your understanding

▶ Put (√) or (x):

- Oceans and rivers always contain salt water.
- Water and plants are considered renewable resources.

()

In the Assessment Book : Try to answer :

Self-Assessment 1

groundwater pollute nature المياه الجوفية يتلوث الطبيعة renewable beneath

متحدد تحت / أسفل

water cycle resource

دورة المياه مصدر

1	Cł	oose the correct ans	swer :		
0	1.	All the following are	components o	f the atmosphere,	except
T.		a. oxygen gas. b. r	itrogen gas.	c. molten rocks.	d. water vapor.
	2.	Rocks are broken do	own into smalle	er particles during	process.
		a. photosynthesis		b. weathering	
ł		c. erosion		d. respiration	
	3.	Which of the following	g is a part of t	the hydrosphere?	
		a. Water. b. A	Air.	c. Rocks.	d. Plants.
	4.	Which of the following	ng is a part of	the biosphere?	
		a. Ice. b. c	clouds.	c. Water.	d. Animals.
•	5.	Water covers nearly	of the E	Earth planet.	
		a. $\frac{1}{4}$ b. $\frac{1}{2}$	2	c. 1/5	d. $\frac{3}{4}$
0	6.	By heating of water	it changes fro	m state to	state
		a. solid – liquid. b. l	iquid – solid.	c. liquid – gas.	d. gas – liquid.
•	7.	Water is used in all	he following p	ourposes, except	
		a. recreation. b. l	ourning.	c. bathing.	d. manufacturing
•	8.	At the beginning of v	water cycle in	nature, water	and goes into the air
		forming			
		a. freezes - snow.		b. evaporates – o	clouds.
		c. freezes – clouds.		d. evaporates – s	snow.
2	C	hoose from column (B) what suits	it in column (A) :	
0	1.	(A)	<u> Kirigalian</u>	(B)	
		1. Geosphere	a. contains o	xygen and nitroge	n gases.
		2. Atmosphere	b. contains ro	ocks and heavy m	etals.
		3. Biosphere	c. contains fr	esh water and sal	t water.
		4. Hydrosphere	d. contains a	nimals and plants	

e. contains clouds and molten rocks.

2.	<u>/</u> ^)	(P)		
	1. Oceans	a. contain fresh water or salt water.		_
	2. Lakes	b. contain salt water only.		
	3. Rivers	c. contain mixture of fresh water and salt water.		
	4. Estuary	d. contain fresh water only.		
	5. Groundwater	e. is the water found under the Earth's surface.		
	5. Groundwater	f. is the water found in a gas state.		
			-	-
	1 2			
Pu	it (v) or (x):			
		s divided into fresh water and salt water.	(
		udes rocks and heavy metals is called hydrosphere.	(,
		y reason for weathering and erosion of rocks on the	,	
	Earth's surface.	,	(
4.	Water is important for	or growing of living organisms.	(
		phere, the biosphere will not exist.	(
		nto water vapour in extreme cold weather.	(
		water on Earth doesn't change.	ì	
	Some animals and p		(
		from an area of low place to an area with higher place.	ì	
		water decreases or water get polluted, biosphere wil		
	be affected.	mater accreases at mater get penales, are species and	(
101.	ita the scientific tor	em of each of the following .		
		m of each of the following : surrounded by land. (١
	A water body that is			
		esh water of a river meets the salt water of a sea. (/
	the atmosphere ther	ontinuous movement of water from the Earth to to the Earth again. ()
4.	The process of brea	king down of rocks into smaller particles due		
		water or temperature. ()
5.	The process in which	n the small particles of rocks are transported		
1	fr <mark>om a place to anot</mark>	ner. ()
Co	mplete the followin	g sentences :		_

- 1. The Earth's system that includes all living organisms is called
- 2. Water is responsible for process and process of rocks.

0	3. Water bodies on Earth can change from liquid state to	state by
	freezing, while they can change into state by	evaporation.

0	4. Fresh water forms some water bodies such as	and some	lakes,	while
	seas and oceans and formed of water.			

- 5. When a river meets a sea, anis formed.
- 7. During the water cycle in nature, water evaporates forming, then it returns back to the Earth's surface during

👩 Give reasons for :

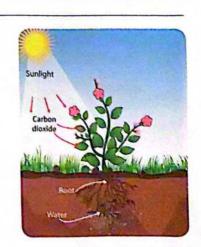
- 1. Water is important for all plants on Earth.
- 2. Water can affect nonliving things like rocks.
- 3. Our planet looks like a blue marble from the space.
- 4. Water that forms the hydrosphere is one of the renewable resources on Earth.

7 What happens to ...?

- 1. The state of water when it is subjected to extreme cold weather.
 - 2. Fresh water of a river when it meets the salt water of a sea.
- @ Green plants can make their food by photosynthesis process. In this process plants take water from the soil, carbon dioxide and sunlight.

From the previous paragraph, find out the words that belong to each system and write them in the following table.

Atmosphere	Hydrosphere	Biosphere	Geosphere
(a)	(b)	(c)	(d)



▶ Put (√) or (x):

- 1. The components of Earth can be classified into hydrosphere and biosphere only. ()
- 2. Oceans and seas are considered as a part of the atmosphere. ()
- In this activity, you are going to observe some components of an environment around you and classify them into the four main groups you have learned which are geosphere (land), hydrosphere (water), biosphere (life) and atmosphere (air).

Imagine that you are at a park as shown in the picture below:



schoolyard components

فناء المدرسة مكونات environment classify

بيئة يصنف We can classify the living organisms and nonliving things in the previous picture as shown in the following table:

Geosphere	Hydrosphere		sphere	Atmosphere
(Land)	(Water)		_ife)	(Air)
• Soil. • Rocks.	• Puddle.	Boy.Birds.Tree.Flowers.	 Girl. Butterflies. Grasses.	 Wind (that moves the leaves). Breathing of humans and animals.



Check your understanding

▶ Classify the following items in the table below: (Rivers - Insects - Mountains - Seas - Deserts - Crocodiles - Wind)

Biosphere	Geosphere	Atmosphere	Hydrosphere

In the Assessment Book:

Try to answer:

Self-Assessment 2



صحاري

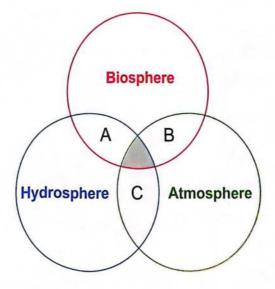
Exercises on Lesson 2

	Understand	OApply	e Analyze	● Evaluate	O Crea	ite
1	Choose the correc	t answer :				
	1. Rainwater is a p	part of				
	a. biosphere.	b. hydrosphere.	c. geosphere.	d. atmosphere.		
•	2. Presence of dol	phins in oceans re	epresents an inte	raction between	*********	
	a. biosphere - h	ydrosphere.	b. biosphere – g	geosphere.		
	c. hydrosphere -	- atmosphere.	d. hydrosphere	geosphere.		
•		Il tree due to blow		ls is an example of a	an	
		atmosphere.		vdrosphere.		
		geosphere.				
			•		nis is	an
	12000 2000 2000	eenand		k and soil pores. Th	110 10	u .,
	a. geosphere – a	atmosphere.	b. biosphere – a	tmosphere.		
	c. geosphere - h	nydrosphere.	d. hydrosphere -	- biosphere.		
				through soil rocks t involved in this sen		?
	a. Hydrosphere.		b. Geosphere.			
	c. Atmosphere.		d. Biosphere.			
2	Put (✓) or (X) :				T.	
•	1. Earth's systems	don't interact with	each other.		()
0	2. When wind carri	es seeds of some	plants to new pla	ces, an interaction		
	between atmosp	here and biospher	re can be observe	d.	()
•	· · ·	ocks as a result of een hydrosphere a		is an example of an	()
4				ve from atmosphere	•	1
	to hydrosphere.				()

Complete the following senter	nces	:
-------------------------------	------	---

Give a reason for the following:

- Hiding of worms inside the soil is an example of an interaction between two Earth's spheres.
- The following model shows a diagram containing three interacted Earth's spheres. Read these sentences, then put (✓) or (X):



- Area (B) can represent a student respire in oxygen gas.
- 2. Area (A) can represent small rocks in an ocean. ()
- Area (C) can represent evaporation of sea water forming clouds and falling of rains.

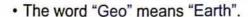
▶ Put (√) or (x):

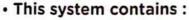
- The main systems (groups) of Earth are hydrosphere, geosphere, atmosphere and biosphere.
- 2. Biosphere, hydrosphere, atmosphere and geosphere interact together. (
 - Scientists named each of the four Earth's systems using the word "sphere" because the shape of Earth is very close to be a sphere.
 - · In this activity, we are going to learn more about the four Earth's systems.

Geosphere

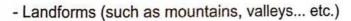
Geosphere:

It is the system that includes all the layers of Earth which are the crust, the mantle and inner and outer core.

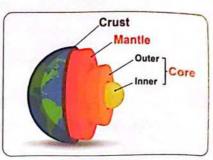




- Rocks.
- Minerals.
- Soil.



- Molten rocks inside Earth.



Earth's layers

Hydrosphere

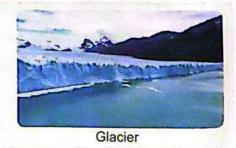
Hydrosphere:

It is the system that includes all of the water on, under and above Earth.

- · The word "Hydro" means "water".
- · This system contains:
 - Oceans.
- Seas.
- Rivers.
- Groundwater.
- Glaciers.



- Glacier is a large sheet of ice or snow that moves slowly over Earth's surface.
- Hydrosphere includes another system known as "cryosphere" which means the frozen water on Earth.



Earth's systems landforms include valleys أنظمة الأرض النضاريس ينضمن وديان crust molten rocks mantle cryosphere القشرة صخور منصهرة الوشاح الغلاف الجليدى

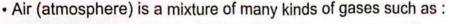
inner core glacier outer core minerals اللب الداخلي نهر جليدي اللب الخارجي معادن

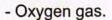
Atmosphere

Atmosphere:

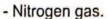
It is the system that includes all the gases that surround Earth.

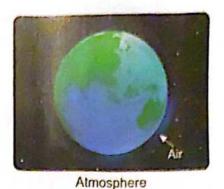
- · The word "Atmos" means "vapor".
- The atmosphere is usually called "air".





- Carbon dioxide gas.





Biosphere

Biosphere:

It is the system that includes all living organisms on Earth.

- · The word "Bio" means "life".
- Biosphere contains :
 - Humans.
- Animals.
- Plants.

Earth's systems interact:

The following table represents some phenomena that show the interaction between the different four systems of Earth :

Interactions	Phenor	mena
Hydrosphere interacts with geosphere.	Erosion of rocks by water.	• Formation of lakes.
Atmosphere interacts with biosphere.	During photosynthesis process, platake in carbon dioxide gas from air give out oxygen gas to air.	Carbon
Geosphere interacts with biosphere.	During photosynthesis process, so provides nutrients for plants roots.	il Nations

carbon dioxide

ثانی أ<mark>کسید الکربون</mark> ظواهر provide nutrients

يمد المواد المغذية

Note

In the previous table, there is an exchange of energy and matter in each phenomena.

S		
一日	1	
一門		
1		

Check your understanding

. 01	Alexander and the second	The Secretary of the Secretary
h Chanca	THO COPPOST	BUCINOR .
CIIOOSE	the correct	allswel.

•	1. Hydrosphere	includes all the f	ollowing items, except	
	a. oceans.	b. rivers.	c. molten rocks.	d. groundwater.

- 2. The large sheets of ice or snow that moves slowly over Earth's surface are called
 - a. minerals. b. glaciers. c. rocks. d. biosphere.

▶ Put (√) or (x):

1. Geosphere contains crust and mantle only.	(
--	---

2. Atmosphere is a mixture of some different gases. (

Activity 7 Characteristics of the Hydrosphere and Biosphere

► In this activity, we are going to study some characteristics of both the biosphere and hydrosphere, and some examples that show their interactions.

Some characteristics of biosphere

 Biosphere is any part of Earth in which life can exist where it includes humans, animals and plants.

Biome:

It is a large region of the world that has similar soil, climate, plants and animals (wildlife).

· Examples of biomes:

- Deserts.
- Forests.
- Rainforests.
- Grassland.
- Wetland.



Desert biome on Earth

Some characteristics of hydrosphere

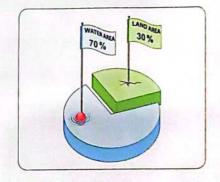
- Hydrosphere contains all the liquid, solid and gaseous water on Earth.
- Nearly 70 percent (70%) of Earth is covered by water.
- · Water that covers Earth may be:

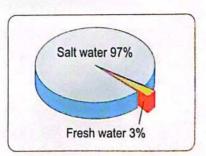
▶ Salt water :

- It forms about 97 percent (97%) of water on Earth.
- It is found in oceans, seas, gulfs and some lakes.

▶ Fresh water:

- It forms about 3 percent (3%) of water on Earth.
- It is found in rivers, rainwater, groundwater and most of lakes.





 Most of the fresh water on Earth is not found in liquid or running water, but it is found in the form of frozen water as large pieces of ice known as glaciers.

biome	منطقة حيوية	rainforest	غابة مطيرة	wetland	ارض رطبة
salt water	ماء مالح			climate	المناخ
grassland	أرض عشبية	percent	نسبة مئوية	fresh water	ماءعدب

Notes

- 1. Groundwater is water that lies beneath (under) Earth's surface and has been leaked into Earth through a layer of porous rocks forming what is known as aquifer.
- Groundwater supplies wells and springs with water.



Aquifer

▶ Examples of hydrosphere and biosphere interactions :

Plants need water to survive



Animals drink water to survive



Humans drink water to survive



Water is the habitat of fish





Check your understanding

- ▶ Put (√) or (x):
 - 1. Most of water surfaces on Earth contain salt water.
- 2. Most of lakes have fresh water, while some other lakes have salt water. (



Digital Extension Activity

Activity 8 " Identify Interactions "in the school book is an optional digital activity. You can do this activity by scanning its QR code found in your school book.

leak
habitat
springs
aquifer

In the Assessment Book: Try to answer: Self-Assessment (3)

Exercises on Lesson 3

Understand		OAME	e An	alyzo	@ Evaluate	⊚ Create			
Choose th	e correc	t answer:							
1. The number of Earth's layers that form geosphere is layers.									
a. two		b. four	C. 8		d. eight				
2. Mountains and valleys are parts of									
a. geos	ohere.	b. atmosphere	. c. l	oiosphere.	d. hydrosp	here.			
3. Nitroger	n and ox	ygen are gases	that m	ake most o	of the				
a. biosp	here.	b. geosphere.	C.	hydrospher	re. d. atmosph	nere.			
• 4. 97% of	Earth's	water is							
a. salt w	ater.	b. sugar water	. с.	fresh water	d. frozen w	vater.			
5. Formati	on of lal	kes is an examp	le of a	n interactio	n between	and			
13.50		nydrosphere.			e – biosphere.				
1.00		 geosphere. 		•	 atmoshpere. 				
	23/	in the soil, this				and			
A Committee of the Comm		atmosphere.		501 V.**	– geosphere.	•			
100		 geosphere. 			re – atmospher	e.			
	9.5	water bodies of							
a. gulfs.		b. seas.		oceans.	d. rivers.				
 8. Which of surface 		llowing is found	betwe	en pores of	rocks below E	arth's			
a. Ice.		b. Groundwate	er. c.	Oceans.	d. Water v	apor.			
9. Polar be	ars live	on ice, this is an	examp	ole of an int	eraction between	n and			
a. atmo	sphere -	– hydrosphere.	b.	geosphere	e – hydrosphere				
c. biosphere – geosphere. d. biosphere – cryosphere.									
Choose from column (B) what suits it in column (A):									
		(A)			(B)				
1. The wo	ord "Geo	" refers to		a. water					
2. The wo	ord "Hyd	ro" refers to		b. Earth					
3. The word "Atmos" refers to									
4. The wo	ord "bio"	refers to		d. vapor					
				e. Sun					
1		2		3	4				

Put (//) or (x): 1. All living organisms are parts of the atmosp	phere	
 2. Oceans, lakes and rivers are included in th 		
3. Deserts and forests are examples of biometric street.	1	
4. Less than 50% of Earth's surface is covere	1	
	1	
5. Most of the salt water on Earth is found in the salt water on Earth is found in the salt water of the salt water on Earth is found in the salt water on Earth is salt		
6. Fresh water forms about 3% of water on Ea	,	
 7. Without water, all forms of life will disappea 		
 8. Wells and springs obtain their water from a 		
 9. All animals and plants can live in aquatic has 	abitats. (
Write the scientific term of each of the follow	wing :	
 1. The system of Earth which contains all diffe 	erent landforms. (
• 2. The Earth's system which is made up of wat	ter. (
3. The frozen water part of the hydrosphere.	(
 4. The Earth's system which consists of a mix 	kture of gases	
surrounding Earth.	(
• 5. The system that includes humans, animals	and plants on Earth. (٠
6. A large area of the world that has similar so	oil, climate, plants	
and animals.	(••••
Complete the following sentences:		
 1. The Earth consists of 4 layers which are the and inner core. 	e , the and ou	te
2. The large sheet of ice or snow that moves as	slowly over Earth's surface is kno	Wi
3. Breaking down of rocks by the effect of run	ining water is an example of	
interaction between two Earth's systems when the same and the systems when the same are same as the systems when the same are same as the systems when the systems were same as the system of the systems when the system of the sys	then the amount of salt water	or
4. The amount of fresh water on Earth is		
5. Most lakes have water, while some		
 6. The Earth's sphere that contains rocks, sar 	nd and soil is known as	
6 Give reasons for :		
 1. Importance of atmosphere for plants in male 		2700
2. More than 50% of known living organisms I	CONTROL CONTRO	

34

. 3. Most of the fresh water on Earth can't be used for drinking.

What happens if ? 1. Plants can't get carbon dioxide gas from air.			
We compare the rainforest biome with the desert	bior	ne.	
Look at this graph that shows the percentage of bo in Earth's hydrosphere, then put (🗸) or (x) in front			
1. Area A represents salt water.	()	
2. Seas and oceans are examples of water bodies that belong to area (B).	()	
3. During water cycle, water evaporates from both areas (A) and (B).	()	
4. The type of water in rivers belongs to area (A).	()	
Read the following paragraph, then complete the	ser	nter	nces:
Frogs are amphibians, so they can live on land and gas and exhale carbon dioxide gas. They feed on hide from their predators.			
1. Frogs can live on land, this is an interaction bet	vee	n b	iosphere and
2. Hiding of frogs in water is an interaction between	n b	ios	phere and
3. Respiration of frog is an example of an interacti			



Activity 9 Hydrosphere or Biosphere

- ▶ Look at the opposite picture that shows some aquatic organisms in an ocean, then put (√) or (x):
 - Oceans are parts of the hydrosphere as they contain fresh water.
 - Any change happens in the water of an ocean affects the aquatic organisms live in it. ()



In the previous activity, you observed some images and observations that show the interactions between the hydrosphere and biosphere.

- In this activity, read the following observations and try to classify them in the table below into hydrosphere or biosphere as the example given:
 - · A bird makes a home in a tree.
 - · Water evaporates from a pond.
 - · Saltwater waves crash in the ocean.
 - Ants eat a piece of bread.
 - · Running water in a river.
 - · A snake eats a rat.

		rosphere			Biosphere	
	 Rainwater falls on a river. An iceberg breaks off from its glacier. 		 A hawk spots its prey. Bees pollinate a flower. 			
1300						
	90,000					
aquatic	tic	مائية بلقح	crash	یصطدم بـ برکهٔ ماء	hawk	SHERE SELECTION AND ADDRESS OF THE PARTY OF

Activity 10 Types of Aquatic Ecosystems

- Water ecosystems are also called aquatic ecosystems.
- Aquatic ecosystems on Earth can be classified in different ways such as, they can be classified into:
 - Saltwater ecosystems.

Freshwater ecosystems.

Saltwater ecosystems

- Oceans are the largest saltwater ecosystems that cover large parts of Earth's surface.
- · Saltwater ecosystems of oceans and seas include:

Shallow areas:

These areas contain coral reefs and intertidal zones.



Intertidal zone

○ Note

Intertidal zone is the area along the coast that disappears underwater at the high tide and appears at the low tide.

Deep areas :

These areas are called abyssal zones which are very deep areas in oceans, so that sunlight cannot reach them.

 Saltwater lakes are examples of saltwater ecosystems, let's study one of these saltwater lakes.

· Saltwater lakes :

- Some lakes have salt water.
- Lake Assal in Djibouti is an example of saltwater ecosystem.
- Lake Assal has a high concentration of natural salts, so it is too salty for fish and most aquatic animals to live in also, there are few plants that can grow in this area.



Lake Assal

- There are many different types of bacteria live in Lake Assal.
- Lake Manzala, Lake Mariout, Lake Bardawil and Lake Idku are saltwater lakes found in Egypt.

shallow areas abvssal zone high tide

منطقة شديدة العمق

intertidal zone مناطق ضحلة concentration deep areas

منطقة المد والجزر تركير مناطق عميقة

low tide coral reefs bacteria

شعاب مرجانية

Freshwater ecosystems

Freshwater ecosystems include :

Ponds and lakes:

- In many ponds and lakes, the water is present all year.
- Some other ponds and lakes dry up in the hot summer months, so animals and plants that live there must adapt to the changes that happen in these ponds and lakes.
- Lake Nasser, Lake Qaroun and Lake of Wadi Al-Rayan are freshwater lakes in Egypt.



Pond

Flowing water bodies:

- They include rivers and streams (streams are small bodies of flowing water).
- Water is always moving in the flowing water bodies.
- Streams and rivers connect other bodies of water such as lakes, oceans and seas.
- Many different plants and animals live in flowing water bodies.



Stream

♥ Notes

- 1. An estuary is a special type of aquatic ecosystems that is formed along the edges of seas or oceans, where a river or stream ends, so an estuary is formed where a river meets a sea or an ocean.
- 2. Estuaries have a mixture of salt water from the sea or ocean and fresh water from a river or stream.



Estuary

Check your understanding

Write the scientific term :

- The area along the coast between the high tide and the low tide.
- The water body where a river meets a sea or an ocean.

(.....) (.....)

dry up adapt

stream edges

حداول المياه

Activity (11) Aquatic Ecosystems

In this activity, we are going to compare between some characteristics and species (living organisms) that live in three different aquatic systems which are: ponds, streams and oceans.

Ponds

- · Type of water: They have fresh water.
- Water movement : They have still water.
- Species live in ponds :

There are different living organisms that live in ponds such as:



Some plants like water lilies.



Some insects live and lay their eggs in ponds.



Some types of worms such as leeches live at the bottom of ponds.

Salamanders and frogs live in ponds and eat insects found there.





Give a reason for :

Some insects lay their eggs in ponds.

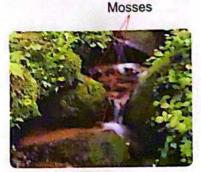
Because ponds have still water, so the eggs will not move away.

Streams

- Type of water: They have fresh water.
- Water movement: They have running water, where water in streams are cool and flows fast.
- · Species live in streams:

There are different living organisms that live in streams such as:

- Some mosses attach themselves to the rocks of streams (mosses look like algae).



Stream

species salamander lay

أنواع / أجناس حيوان السلمندر

water lily attach worm

نبات اللوتس يلتصق

leeches still water mosses / algae

العلقيات مياه راكدة الطحالب

- Some animals live in streams such as :







Catfish

Crayfish

Trout

Oceans and seas

- Type of water: They have salt water.
- Water movement: Water of oceans and seas is constantly moving in the form of waves that crash onto the shore.
- · Species live in oceans :

There are many living organisms that live in oceans and seas such as :









Kelp

Dolphin

Starfish

Moses fish (Flounder fish)

Notes

- 1. Oceans and seas environments include many smaller ecosystems.
- 2. Wind also moves the water of oceans and seas forming waves.
- 3. Ocean water circulates around the world in patterns called ocean currents.
- 4. The directions of ocean currents around the world can be predicted.

Check your understanding

- ▶ Put (√) or (x):
 - 1. Dolphins live in ponds and streams.

2. Ponds and streams contain fresh water.

3. Water of oceans is constantly moving in the form of waves.

In the Assessment Book:

Try to answer: Self-Assessment (4)

cattis
circul
chore

ish	
ulate	
re	



constantly predict flounder fish

kelp trout ocean currents

عشب البحر سمك السلمون المرقط نيارات المحيط

1	Choose the correct answer.	
0	1. Cats and grass are parts of the	········
	a. atmosphere. b. hydrosphere.	c. biosphere. d. geosphere.
	2. Which of the following is not a cor	nponent of the hydrosphere?
	a. Oceans. b. Rivers.	c. Lakes. d. Rocks.
	3. A spring flows out from a rock is a and	n example of an interaction between
	 a. hydrosphere – geosphere. 	b. hydrosphere – biosphere.
	c. biosphere – geosphere.	d. biosphere – atmosphere.
0	4. Aquatic ecosystems can be classif	fied into ecosystem and ecosystem.
	a. forest - desert.	b. savannah – tundra.
	c. grassland - rainforest.	d. freshwater – saltwater.
0	5. All the following are characteristic	cs of abyssal zone, except
	a. they are very deep areas.	b. sunlight cannot reach it.
	c. they are dark areas.	d. they are shallow areas.
0	6. Rivers and streams contain	water, while ponds contain water. c. running – still d. still – running
	7. Estuaries have a mixture of	. and
	a. groundwater - rainwater.	b. fresh water – salt water.
	c. groundwater - fresh water.	d. rainwater – salt water.
	8. Water lilies can live in	
	a. ponds. b. seas.	c. oceans. d. deserts.
0	9. Among animals that can be found	d in ponds are and
	a. lions - salamanders.	b. dogs – frogs.
	c. frogs – salamanders.	d. foxes - bears.
	10is a saltwater lake in Egypt	i
	a. Lake Nasser	b. Lake Qaroun
	c. Lake Manzala	d. Lake of Wadi Al-Rayan
•	11. All the following are saltwater lak	es, except
	a. Lake Assal.	b. Lake Nasser.
	c. Lake Idku,	d. Lake Bardawil.

Unit 3 | Concept

Choose from column (B) what suits it in column (A):

(A)	(B)	
Shallow areas of oceans Abyssal areas of oceans Mosses Dolphins	a. don't receive sunlight.b. contain coral reefs.c. live in salt water.d. live in fresh water.e. live in deserts.	

Put (✓) or (X):

• 1	. Living organisms are parts of geosphere.	(
• 2	2. All of the water on Earth represents the hydrosphere.	(
• 3	3. There are no living organisms live in the hydrosphere.	(
• 4	. Gases which surround the Earth represents the atmosphere.	(
• 5	 There is only one type of aquatic ecosystems known as saltwater ecosystems. 	(
6	The deep areas of the ocean that sunlight cannot reach it, are called abyssal zones.	(
• 7	. Some ponds and lakes may dry up in winter months.	(
8	. The place where two oceans meet is called an estuary.	(
9	. Some types of worms such as leeches live at the bottom of ponds.	(
10	. Rivers and streams are freshwater moving bodies.	(

Write the scientific term of each of the following:

• 11. Some animals live in streams such as catfish, crayfish and trout.

0	The largest saltwater ecosystems that cover large parts of			
	Earth's surface.	(
•	2. Areas of the ocean which contain coral reefs and intertidal zones.	(

- 3. The area along the coast that disappears at the high tide and appears
- 4. An area where a river or a stream meets an ocean.

[3] Complete the following sentences:

at the low tide.

- 2. We can classify the aquatic ecosystems according to their amounts of salt into ecosystem and ecosystem.

(.....

 3. Intertidal zone is the area along andtide. 	g the ocean betweer	the tide			
 4. Abyssal zone in the ocean is a 	dark area as	cannot reach it.			
5. Some ponds and lakes dry up in the months.					
6. According to water movement, streams that have was	ponds have				
 7. Kelp, starfish and Moses fish li saltwater ecosystems in the Ea 		are considered the largest			
Give reasons for :					
 1. Some ponds and lakes may dr 	ry up during some m	onths.			
 2. No green plants can survive in 		of oceans.			
3. Mosquitoes lay their eggs in possible controls.	onds.				
What happens to?					
1. Animals that live in lakes if the	y dry up.				
2. The eggs of a frog if it lays its	eggs in a river instea	d of a pond			
2. The eggs of a flog if it lays its	eggs iii a river iiistea				
B Look at the opposite picture, in					
shows a river, and area © show then choose the correct answer:		C) B			
		TO A STATE OF THE			
1. Area (B) represents	h laka	A			
a. pond.	b. lake.				
c. estuary.	d. groundwater.				
2. Water lilies can be found in					
a. area (A).	b. area (C).				
c. both area (A) and area (C).	d. both area (B) a	nd area (C).			
3. All the following organisms car	n be found in area	;, <u>except</u>			
a. dolphin. b. starfish.	c. flounder fish.	d. frog.			

LESSON

Activity 12 Record Evidence Like a Scientist

You have learned a lot about how Earth's hydrosphere and biosphere interact. In this activity, which will be repeated at the end of each concept, we will learn how to think like scientists to answer a question about one of the main points of this concept through four main steps.

- Step (1): The Question.
- Step (2): My Claim.
- Step (3): My Evidence.
- Step (4): My Scientific Explanation.

Step (1) The Question

How does Earth's biosphere interact with Earth's hydrosphere?

(2) Step (2) My Claim

Living organisms in the Earth's biosphere depend on the interactions with the Earth's hydrosphere for survival.

Note

Your claim should be formed of a sentence that gives an answer for the previous question in step (1).

(1) Step (3) My Evidence

- Water from rain gives plants the water they need to survive.
- Humans and animals need to drink water to survive.
- Many animals live in water habitats.

Note

You should mention enough and suitable evidence that support your claim.

Step (4) My Scientific Explanation

- Earth's hydrosphere interact with Earth's biosphere when animals and plants live in it or use it for their basic needs.
- Plants depend on water to grow.
- Some animals live in water where they depend on the underwater environment for shelter and to find the food that they eat.
- Humans and animals need to drink enough water to survive.

Note

Your scientific explanation should explain your claim and evidence introducing some supportive examples from what you have learned.

Activity B S T E M in Action

▶ Put (√) or (x):

- Plastic waste materials cause water pollution. (
- Throwing plastic waste materials in rivers and seas don't affect the life of aquatic organisms. (



)

- ▶ To understand water, hydrologists must study how the hydrosphere interacts with the other spheres on Earth such as:
 - How water runs across the land (geosphere).
 - How water affects living organisms (biosphere).
 - What happens to water in air (atmophere).

Hydrologists are scientists who study water

Microplastics

- Microplastics are plastic pieces whose lengths are less than 5 millimeters.
- Microplastics are formed when plastic waste is broken down into small particles by wind, sunlight and wave action at sea.
- Microplastics are found everywhere on Earth, from the highest place on land to the deepest part of the ocean.
- Hydrologists are concerned about the amount of plastic pollution found in the hydrosphere.
- Microplastics found in aquatic ecosystems are more harmful to aquatic organisms than large plastic waste, where aquatic organisms cannot differentiate between their real food and plastic waste, so they can eat these pieces of plastic and get harmed.



Analyzing pollution

- A group of scientists in india wanted to learn more about the effects of microplastics on the environment.
- These scientists took samples of the water and the soil of a polluted river and they
 found that microplastics were present in the water and the soil of that river.
- After analyzing these samples, scientists found that most of these microplastics were from decayed plastic carry bags, packing materials, and fishing lines.

hydrologists samples poliution fishing lines علماء المباه عينات تلوث خيوط الصيد

concern علماء packing materials عبنات analyzing

یقلق مواد تعیئة تحلیل defferentiate microplastics decay

يفرق الجسيمات البلاستيك<mark>ية</mark> تفتت



○ Note

Rivers carry plastic waste materials from land to the oceans.

_	1
I	-B
1	一日
1	11

Check your understanding

▶ Complete the following sentences using the words below :

(wind - aquatic organisms - sunlight)

- 1. Tiny particles of plastic enter food chains when eat them.
- 2. Sea waves, ____ and ___ break down plastic materials into smaller particles.

In the Assessment Book:

Try to answer:

Self-Assessment 5

Model Exam on Concept (3.1).

Activity Review : Hydrosphere and Biosphere Interactions

▶ We can summarize this concept in the following main points :

- Living organisms need water to drink, grow and survive.
- Water can cause weathering and erosion of rocks on the Earth's surface.
- Weathering means the breakdown of rocks into smaller particles due to the effect of rain, wind, temperature etc.
- Erosion process means the transport of small particles of rocks to another place by water or wind.
- Nearly, three-quarters (more than 70%) of Earth is covered by water, so our planet looks like a blue marble from space.
- The total amount of water on Earth does not change, even if water changes from one state to another, so we cannot make new water, but we can recycle water.
- Water bodies on Earth can change from liquid state to :
 - Solid state (ice) by freezing in extreme cold weather.
 - Gas state (water vapor) by evaporation in hot weather.

Importance of water:

- Humans and animals drink water to survive.
- Plants need water to grow.
- Some animals and plants live in water.

· Uses of water:

Humans use water in many purposes such as :

Preparing food.

- Bathing.

- Cleaning.

- Recreation.

- Travelling.

- Manufacturing.

· Water bodies on Earth:

- Oceans and seas: They are large water bodies that always contain salt water.

· Lakes:

- They are water bodies surrounded by land.
- They are often contain fresh water, but sometimes they contain salt water.

· Rivers:

- They are water bodies that always flow from areas of high altitude (high places) to areas with low altitude (lower places) in definite channels.
- They always contain fresh water.

· Estuary:

- It is a water body at which the fresh water of a river meets the salt water of a or ocean.

· Runoff:

It is a water body that is formed of water from rain or melting of snow and move into rivers or the ground.

Groundwater:

- It is the water that lies beneath the Earth's surface, and has been absorbed in Earth through a layer of porous rocks forming aquifer.
- Water is one of the renewable resources on Earth because it has what is called "water cycle" in nature.

· During water cycle in nature :

- Water presents in water bodies on Earth evaporates and goes into the air forming clouds.
- Water returns back to the Earth's surface during raining.
- The four Earth's systems are: Geosphere, hydrosphere, atmosphere and biosphere.

Geosphere

It is the system that includes all the layers of Earth which are the crust, the mantle and inner and outer core.

· This system contains:

- Rocks. Minerals. Soil.
- Landforms (such as mountains, valleys... etc.)
- Molten rocks inside Earth.

Hydrosphere:

It is the system that includes all of the water on, under and above Earth.

This system contains:

- Oceans. - Seas. - Rivers. - Groundwater. - Glaciers.

Atmosphere:

It is the system that includes all the gases that surround Earth.

- The atmosphere is usually called "air".
- · Air (atmosphere) is a mixture of many kinds of gases such as :
 - Oxygen gas. Carbon dioxide gas. Nitrogen gas.

Biosphere:

It is the system that includes all living organisms on Earth.

Biosphere contains:

- Humans.
- Animals.
- Plants.
- There are interactions between the different four systems of Earth.

Biome :

It is a large region of the world that has similar soil, climate, plants and animals.

· Water that covers Earth may be:

- Salt water that forms about 97 percent (97%) of water on Earth and it is found in oceans, seas, gulfs and some lakes.
- Fresh water that forms about 3 percent (3%) of water on Earth and it is found in rivers, rainwater, groundwater and most of lakes.
- · Most of fresh water on Earth is found in the form of frozen water.

· Saltwater ecosystems includes :

- Shallow areas which contain coral reefs and intertidal zones (intertidal zone is the area along the coast that disappears underwater at the high tide and appears at the low tide).
- Deep areas which are called abyssal zones, these areas are very deep, so that sunlight cannot reach them.

· Some water ecosystems:

Points of comparison	Ponds	Streams	Oceans and seas
Type of water :	Fresh water.	Fresh water.	Salt water.
Water movement :	Still water.	Running water.	Constantly moving in the form of waves
Species live in :	 Water lilies. Some insects. Some types of worms such as leeches. Salamanders. Frogs. 	- Some mosses Catfish Crayfish Trout.	Kelp.Dolphin.Starfish.Flounder fish.

- Microplastics are formed when plastic waste is broken down into small particles by wind, sunlight and wave action at sea.
- Aquatic organisms cannot differentiate between their real food and the plastic waste, so they can eat these pieces of plastic and get harmed.
- Rivers carry plastic waste materials from land to the oceans.

Exercises on Lesson 5

OUndersta	nd	O Apply	Analyze	Evaluate	00
Choo	se the corr	ect answer:			
• 1. Hy	drologists s	tudy the moveme	ent of acro	ss the Earth.	
a. a	4	b. rocks	c. water	d. planes	
mid		ng are factors affe exceptb. b. moon.	cting the breakd	own of plastics into	es,
• 3. Wa	iter evapora	ation and its cond	ensing on planet	Earth show an intera	ction
a. I	nydrospher	e – atmosphere.	b. hydrosp	here – biosphere.	
c. t	oiosphere –	geosphere.	d. biospher	re – atmosphere.	
	the followingeas, excep		be negatively affo	ected by throwing plas	tic w
a. f	ish.	b. shrimps.	c. corals.	d. foxes.	
2. So and3. Mid4. The of a	d plastic was proplastics of prowing plast equatic orga	organisms cannot ste. an be found in wa ic waste materials	ter as well as in s in rivers and sea	s never affect the life	(((
3 Write	the scienti	fic term of each of	the following:		
	pe of pollut seas.	ion that occurs as	a result of throwing	ng waste in rivers (
				around the Earth. (
• 3. Tin	y plastic par	ticles that result fro	m the breakdown	of larger plastics. (
4 Comp	lete the fol	lowing sentences		30.	
		aste in aquatic eco microplastics.	systems are	harmful to aquati	С
		oss the land is an e	example of an inte	raction between	

- 3. When places would hadened on supposed to content, which is either waves.
 Twy are bridge would this enal particles insent as
- · A The admendate who story water or Earth are collect
- (inversement for
 - Racycling the plants, bufflers in more better than thoseing them in seas and oceans.
- - Aquabic organisms not precise of province realward of their real food.
- A scientist took a temple from a water body is to found that there are very small pieces of plantic less than 5 mm. in length which are known as encomplantics.



Executives on Wiscon &

Caroli at 1865 picture. Short put (27) or (2)

-). This water boots is a part of Earth's atmosphere.
- 2. Surreg organisms that the in this water Solds represent an interaction Surfaceon biosphere and hydrosphere.
- 2. Of completeling are found only in ball water, but not in fresh water
- a. Microphysics due't affect the organisms that her in this water leady
- Micropholitics that bound in this water body are more hamiful to arquate, organisms than large placetic waster.

Model Exam on Concept (3.1)

(A) Choose the correct answer:			(5)
1. Which of the following is a part of	the biosphere?		
a. Ice. b. Clouds.	c. Water.	d. Animals.	
2. Hydrologists study the movement	of across t	he Earth.	
a. air b. rocks	c. water	d. planes	
 3. Groundwater is present under Ea interaction between	b. biosphere – a d. hydrosphere - c. fresh water.	tmosphere. - biosphere. d. frozen water.	This is a
Some points and takes may dry	up during some m		
(A) Dut (A) or (V)	A STATE OF		
2 (A) Put (V) or (X):	of low place to an a	with higher -le	(5 maria
A river always flows from an area of a land and a land and a land a		rea with higher pia	ice. (
2. All animals and plants can live in a		h and trout	(
 Some animals live in streams such Some human activities are respon 			(
(B) What happens if? Aquatic organisms eat pieces of			
(A) Complete the following sentence	25:		(5 mark
 Large plastic waste in aquatic ecos organisms than microplastics. 			
2. Earth's system that includes all livi	ng organisms is ca	lled	

